

Tutorial 1 The Advertising Budget Decision

As a marketing manager responsible for selling a certain item, one of your tasks is to propose some recommendations to the Executive Committee about how to allocate a specified advertising budget over four quarters in a year, with the objective of maximizing yearly profit. Last year's budget of \$40,000 was split into four equal amounts (but the objective might not be achieved). Initial thinking is that you will repeat this spending decision on the item next year. However, the Committee would like to know whether another allocation of \$40,000 budget would be more or most profitable.

The unit selling price and unit production cost of the item are \$40 and \$25, respectively. Data show that the sales quantity (= the number of sold units) of the item depend on seasons, with seasonal adjustment factors estimated by analysts as follows:

The first quarter, Q1	90%
The second quarter, Q2	110%
The third quarter, Q3	80%
The fourth quarter, Q4	120%

(A seasonal adjustment factor measures the percent of average sold units per quarter.)

In addition to the production costs, the following three costs have to be taken into account: the sales expenses (to be projected as follows: Q1 \$8000, Q2 \$8000, Q3 \$9000 and Q4 \$9000), the quarterly advertising expenses (to be determined), and overhead (typically, 15% of a quarter revenue).

The sold units per quarter are between 3200 and 4800 under \$10,000 quarterly advertising expenses. More advertising is, higher sales will be; but advertising for promoting sales has a saturated impact. The analysts also estimated the relationship among the seasonal adjustment factor, advertising expenses and sold units per quarter as follows:

$$\text{Sold units per quarter} = 35 \times \text{Seasonal adjustment factor} \times \text{SQRT}(3000 + \text{Advertising expenses}),$$

where SQRT() stands for the square-root function, which is a built-in function in Excel. For example, SQRT(4)=2.

Preparation questions:

- 1) Write down the formulas (in words) for calculating the profit in Q1.
Hint:
Profit = Revenue – Total cost
Revenue = price × sold units
Total cost = ...
- 2) Assume that you follow last year's quarter advertisement spending decision of \$10,000 on the item next year. Build a spreadsheet model to calculate four respective profits in Q1, Q2, Q3, Q4. **Please make your best effort to build an easy-to-communicate spreadsheet.**

Questions:

1. If you follow last year's quarter advertisement spending decision of \$10,000 on the item next year, what will be the corresponding yearly profit (= the sum of the four quarter profits)?
2. If the unit production cost is 10% higher or 10% lower than the currently assumed value of \$25, what will be the corresponding yearly profit?
3. If the unit production cost rises, at what point will the yearly profit reach zero?
4. What are the optimal allocation of the yearly advertising budget of \$40,000 and the maximum yearly profit?

A subsequent question: What conclusion do you draw from the optimal allocation?

The highest season – Q4 (with the largest seasonal adjustment factor of 120%), the biggest amount of advertising expenses – \$15,263.4166

A smart person knows the meaning of a seasonal adjustment factor and recognizes at first sight that last year's allocation of the advertising budget could not yield the maximum profit.